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Channa Gunawardena
Lancaster University Management School

David Brown
Lancaster University Management School

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MANAGING PROJECT BASED IS INITIATIVES IN THE VOCATIONAL AND TECHNICAL EDUCATION SECTOR OF DEVELOPING ASIAN COUNTRIES: A SOFT SYSTEMS APPROACH TO IDENTIFYING THE ROLE OF INFORMATION AND INFORMATION SYSTEMS

Mr Channa Gunawardena
Department of Management Science,
Management School, Lancaster University,
Lancaster, LA1 4YX, United Kingdom
channa@megaskills.com

Professor David H Brown
Department of Management Science,
Management School, Lancaster University,
Lancaster, LA1 4YX, United Kingdom
d.brown@lancaster.ac.uk

Abstract

This paper is set against a background of national IS initiatives implemented in the Vocational and Technical Education (VTE) sectors of developing Asian countries through donor agency funded projects, which can be seen as Project Intervention Processes (PIPs). This research is based on a seven year research study of IS initiatives implemented through nine VTE sector projects covering Laos, Sri Lanka and Vietnam. The research was undertaken through empirical investigations and a review of secondary data. The IS initiatives studied focussed on aiding strategy formulation and management in the VTE sector as opposed to classroom based training. The research reveals that the process of managing IS initiatives through PIPs using traditional IS theory, which is based on hard approaches, is problematic in terms of generating desirable outcomes from the IS initiatives to address perceived VTE problems. Soft Systems Methodology (SSM) is based on a learning/enquiring cycle and is often used to manage problem situations that are poorly structured. The paper presents two key findings: a SSM based conceptualisation on the information requirements of VTE and a SSM based conceptualisation on the nature and role of information systems (IS) in VTE.

Keywords

Developing countries, SSM, Information and IS, Vocational and Technical Education.

Introduction

The research objectives of this study were twofold, in the context of VTE in developing countries: firstly, identifying management issues of project based IS initiatives in VTE; and secondly making a contribution to the literature specifically in the area of managing project based IS initiatives. The research studied nine projects, three each in Laos, Sri Lanka and Vietnam. Each project was initiated by a sponsor domain (donor agency) for a host domain (Government institutes) in order to address a perceived Vocational and Technical Education (VTE) sector problem and could be viewed as a based Project Intervention Process (PIPs). Each PIP that was studied targeted a multi-organisational VTE sector spanning central government Ministries and agencies, provincial government institutions and VTE schools. Each PIP had a number of IS initiatives, each of which could be seen a sub-intervention. Each of these IS initiatives had a number of 'Activities' with 'Expectations' in terms of a 'Response' from the VTE sector and a set of 'Outcomes'.

The presentation and interpretation of this research is structured into four major parts. Firstly the current state of the area of concern, VTE in Asian developing countries, is reviewed in terms of the literature and key problems highlighted. These provide the contextual setting for the implementation of IS initiatives through donor projects. The second part of the paper positions the research theoretically. The research framework explicitly considers the use of SSM to identify the role of

information and IS in VTE thus improving understanding of the management of project based IS initiatives in VTE. Part three details the research approach and the empirical design. Finally, part four presents the research outcomes and the interpretation of these together with some implications for ongoing research.

VTE in Developing Countries

The VTE literature is extensive but much is centred on areas dealing with education theory, the economics of VTE and ICT adoption in the classroom. In terms of VTE in Asian developing countries, traditional literature sources are limited and key sources are development agencies such as the Asian Development Bank (ADB) and World Bank (WB). The aim of the VTE literature reviewed and summarised in this section was to better understand the nature and scope of VTE in developing Asian countries. This was expected to inform the context of the specific literature dealing with the management of IS initiatives in relevant settings.

VTE Nature and Emerging Issues

In the context of Asian developing economies, the VTE sector plays a key role in meeting the human resource requirements for national economic development (ILO, 2002). The broad aim of VTE is to equip work-forces, in particular school leavers, for job opportunities across a range of labour markets brought about by industry needs (Middleton et al 1993). In recent years many Asian developing countries have undergone a skills gap in their labour markets (ADB, 1999b). In many instances the need for skilled workers has not been met and industry has lagged behind as a consequence. There is tremendous pressure on the VTE sectors to increase the number of people who receive employable skills. Asian Development Bank (ADB) studies conducted in Laos (ADB, 1996), Sri Lanka (ADB, 1999a) and Vietnam (ADB, 1998) conclude that the VTE sectors have the following major perceived problems: they (i) are supply driven and not market driven; (ii) are without Labour and Education Management Information Systems (LMIS and EMIS respectively); (iii) have little or no program or institutional accreditation, or skill standards and testing certification (SSTC) mechanism; (iv) are faced with poorly trained instructors and educational managers; and (v) have out-dated VTE infrastructure, learning materials and instructors' guides which are not related to the needs of employer expectations.

IS Initiatives in VTE

Faced with perceived problem situations outlined above, many Asian developing countries have embarked on national initiatives to modernise their VTE sectors to meet industry needs. These initiatives have been designed and funded by donor agencies such as the ADB, European Commission (EC) and the World Bank and been implemented through projects. These projects have been implemented by a multi-organisational 'host' domain involving education and training Ministries, VTE agencies, industrial sector Ministries, provincial bodies and VTE schools. The projects range in timescale from between six months to six years and are major imperatives due to their financial scale, with projects sometimes over 100 million US dollars in size. IS initiatives have been important components of these projects. Typically these initiatives include Labour Market Information Systems (LMIS), Education Management Information Systems (EMIS), Financial Management Information Systems (FMIS) and Benefit Monitoring and Evaluation (BME) systems.

In terms of IS initiatives in VTE there is a body of literature dealing with specific IS initiatives such as LMIS (dealt with by authors such as Sparreboom, 2001; ILO, 2002), BME systems (Hopkins, 1999) and Learning Management Systems (dealt with by authors such as Commonwealth of Learning, 2002). However this literature is largely based on 'hard approaches' and focuses on the objectives and specifications of these ISs as individual initiatives as opposed to integrating these IS initiatives within a single project based framework to meet the requirements of VTE. This has meant only a small body of relevant literature is available to inform the practice of initiating and implementing IS initiatives through projects in developing countries. The ADB which is the biggest donor agency in the VTE sectors of South and South East Asia has recognised the limited success of implementing IS initiatives through its projects (ADB, 1999b; ADB, 2005).

Theoretical Frameworks

IS and SSM

Within the field of IS, Information Systems Development (ISD) has been influenced by 'hard approaches' with an orthodoxy centred around structured methods with complementary or alternative approaches (Hirschheim *et al*, 1995). According to Checkland and Holwell (1998) soft systems approaches are better suited for managing IS initiatives when dealing with messy situations. According to Checkland and Winter (2005) the 'soft systems' view of management focuses on the social process of 'managing' in complex situations and trying to cope with an ever-changing flux of messy situations and complex issues.

Furthermore according to Checkland and Winter (2005) in these messy situations, the aims and objectives are generally the main problem as opposed how to achieve them. SSM has gained credibility amongst IS practitioners (Mathiassen *et al*, 2000) due to its emphasis on 'learning' about the problem situation and accommodating stakeholder interests rather than trying to solve a particular problem.

Soft Systems Methodology (SSM) emerged in the 1970s from an action research programme of Lancaster University. SSM is particularly well suited to messy project situations with its emphasis on problem situations rather than well defined problems, different worldviews, models as devices for learning rather than prediction and consciously organised inquiry. SSM considers that the real world consists of complexity and confusion and hence the aim is to organize an exploration of it as a learning system. This distinction between hard and soft systems approaches to understanding the real world could be seen from figure 1.

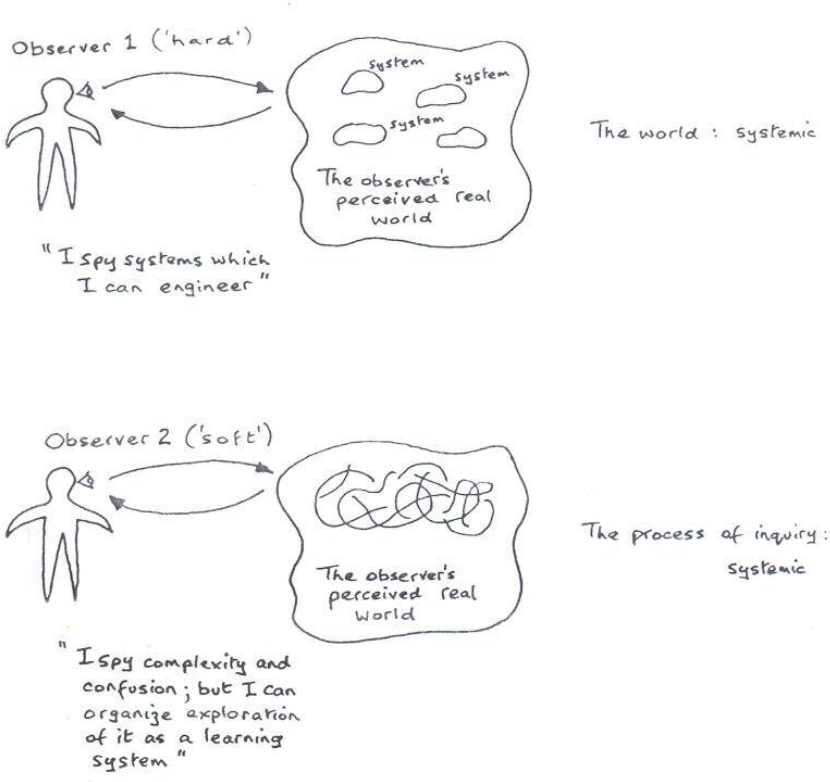

Figure 1: Distinction between Hard and Soft Systems (Reproduced from Checkland, 1990: Figure A2)

The scope of SSM has evolved to being an inquiring or learning cycle as summarized by Checkland (1990) in figure 2. This learning cycle involves five principles (see figure 2) which is based on a complex perceived problem situation or 'content'.

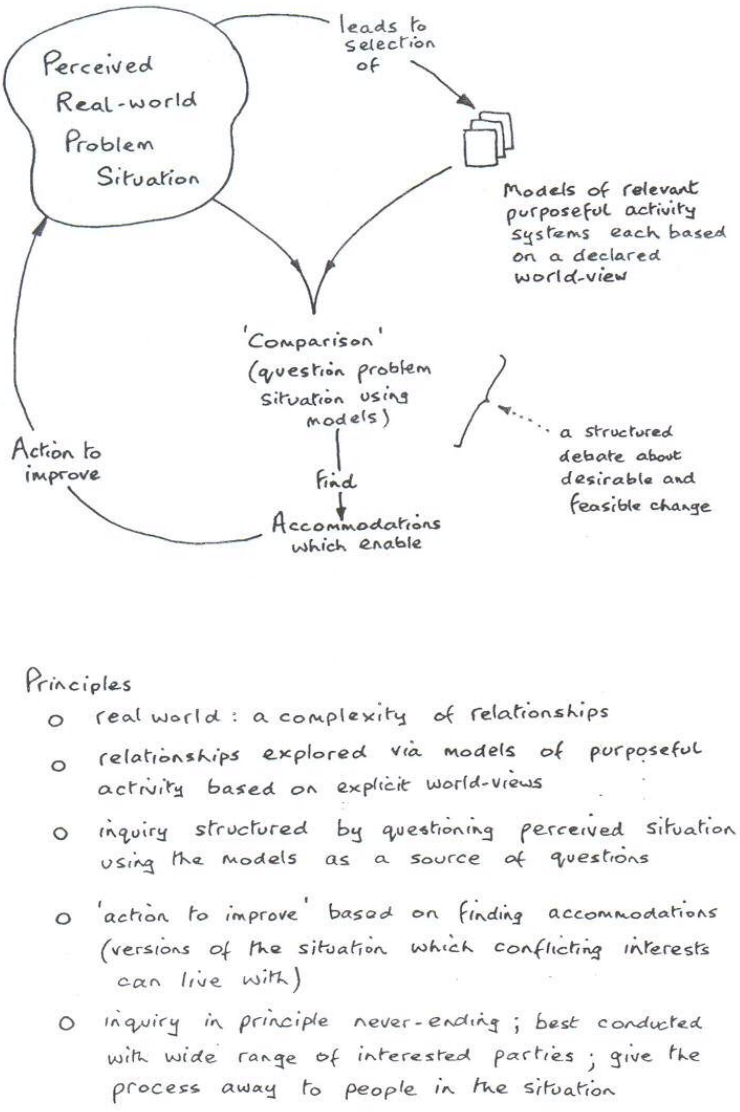

Figure 2: The present form of SSM in terms of the enquiring/learning Cycle (Reproduced from Checkland, 1990: Figure A9)

Checkland further adds that the current version of SSM is a 'four activities model' where the activities are as described in figure 3.

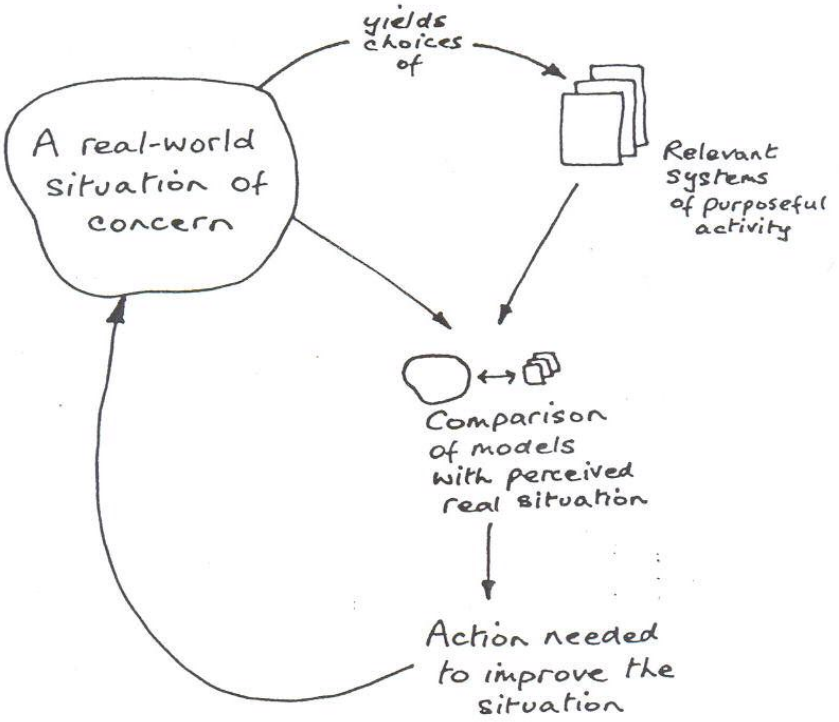

Figure 3: Simplified Form of SSM in terms of Four Activities (Reproduced from Checkland & Scholes, 1990: Figure 1.3)

Having reviewed a wide range of literature on SSM the enquiry/learning cycle behind SSM was applied to interpreting the research findings in terms of understanding the 'problem situation' surrounding PIP based IS initiatives, and the 'five principles' and 'four activities' for inquiring into such a situation. The observations from the research revealed that the process of "managing" PIPs was problematic leading to a new problem 'content'. The PIPs did not generate desirable outcomes from the IS initiatives to improve the perceived VTE problems. In previous research publications (Brown and Gunawardena, 2006) the authors presented a Soft Systems Methodology (SSM) based interpretation of this problem situation introduced by PIPs. This is reproduced in figure 4.

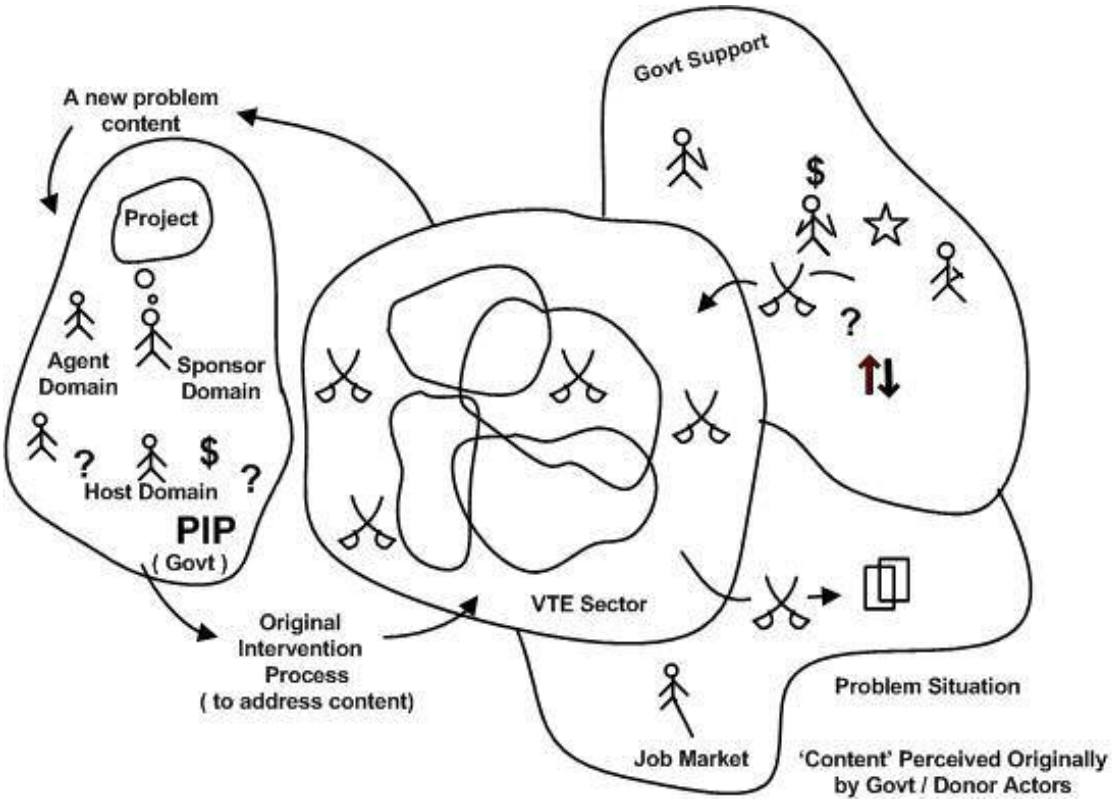

Figure 4: Interpretation of a PIP Situation in VTE in SSM Terms (Reproduced from Brown and Gunawardena, 2006: Diagram 5)

In trying to reflect on ways of improving the management of PIPs with IS initiatives in the VTE sector a SSM based Conceptual Model of the process of managing a PIP with IS initiatives was also developed. This is reproduced in figure 5.

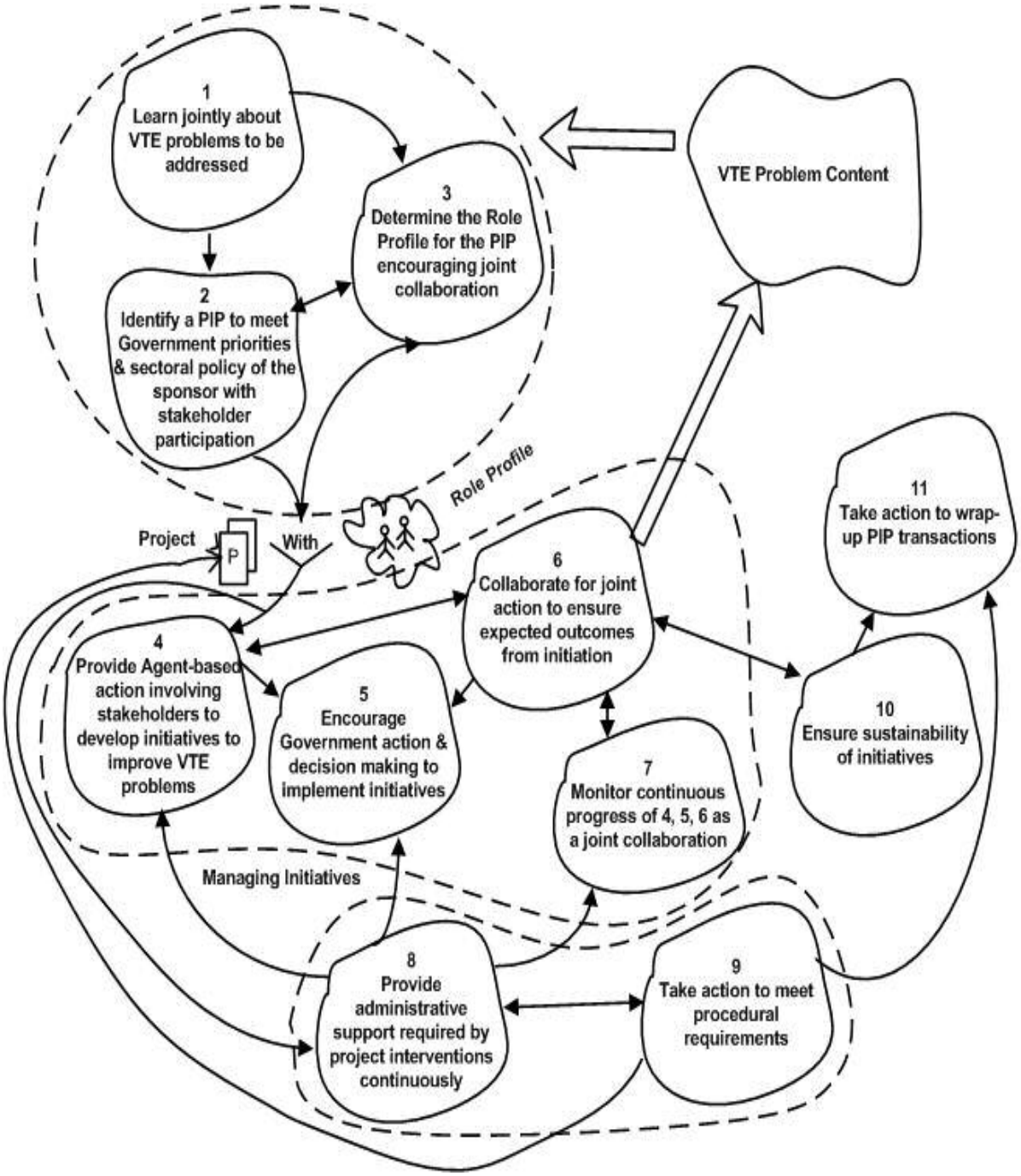

Figure 5: Conceptual Model (CM) of the Process for Managing a PIP with IS Initiatives (Reproduced from Brown and Gunawardena, 2006: Diagram 7)

The comparison between the conceptual model and actual activities revealed that that there is no close collaboration, cooperation and coordination among host, sponsor and agent domains when undertaking these activities for managing PIPs. These was seen as major reasons for PIP based IS initiatives to be problematical.Furthermore it was observed that the task of 'initiating' which defines the IS initiatives and role players is largely problematical and driven by donor agency prescriptions with very limited input from the host domain. This paper builds on the findings of this previous research by applying SSM to identify the specific role of information and IS in the VTE sectors of developing countries. This in turn can inform the 'initiating' task with more accurate inputs from the host government in terms of their needs for information and IS in VTE. The specific SSM concepts and devices applied to the research and the manner in which they were utilised are described further under the Research Approach.

Research Approach

This research is concerned with investigating management issues of IS initiatives in the VTE sectors of developing Asian countries – an extremely complex social process that unfolds within each country's context. In researching this area of concern, it is acknowledged that formal/rational and subjective/social aspects are important as this would reveal a rich perspective of the situation. In this paper, the belief is that the research questions must dictate the philosophical underpinnings of the research. Therefore, due to the need to abstract richness and focus on social aspects, this research is underpinned through a phenomenological philosophy supported through the use of qualitative research methods. The engagement of such an approach is discussed in more detail below.

Checkland's (1985) FMA model of research was adapted and used as the research approach to inform and guide the authors' interventions in order to learn about an area of concern (A), using a methodology (M) and Framework of ideas (F). This is presented in figure 6.

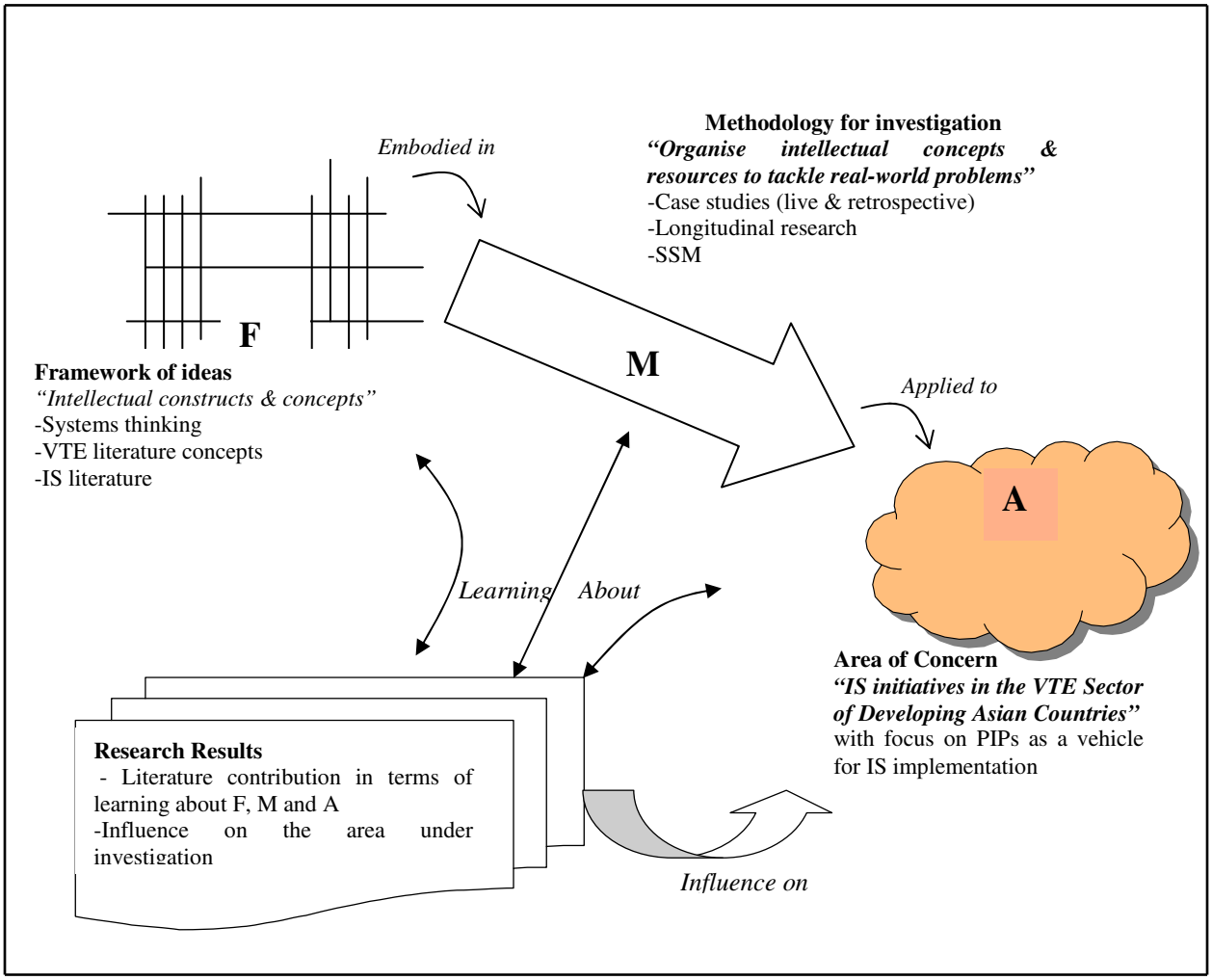

Figure 6: Research Approach

Each authors' 'intervention' was essentially a case study of a project intervention process, with a view to understanding and making recommendations for improvement. In using the FMA model, it is essential, as Checkland and Holwell (1998) point out, to declare *in advance of the action*, the elements F, M and A. In this research, these elements were:

- the **area of concern A** which was 'IS initiatives in the VTE sector of developing Asian countries' with a particular focus on Project Intervention Processes as a vehicle for IS implementation
- the **methodology M** which was based on: the learning cycle of SSM as illustrated in figure 2 and live and retrospective case studies of projects in Laos, Sri Lanka and Vietnam
- the **framework of ideas F** which was the application of concepts embodied in SSM to IS, especially the concept of structuring the enquiry process as a learning system, the use of purposeful activity models as devices to structure discussion on IS initiatives and propose feasible 'changes' to overcome such issues.

Case studies were the main empirical tool and were designed using the approach of Yin (2003). Nine case studies were identified based on nine real world projects with IS initiatives three each in Vietnam, Laos and Sri Lanka. The selection of these projects was driven by accessibility to project actors and project literature, which was not an easy task, due to the sensitive nature of responses from donor agencies, host governments and consultants. Access to these actors was facilitated through a consultancy company involved in implementing aid projects in Asia. The authors positioned themselves as independent researchers studying the projects in question.

A longitudinal process was used involving a combination of live and retrospective studies of projects with each country having one retrospective case study and two live case studies. The live case studies were on projects that were ongoing at the time of undertaking the research. The live case studies were developed through project documentation, interviews with all the project actors and the contextual observations of the researcher observing the project team. The interview samples for each live project consisted of one or two interviewees from the sponsor, between 25 to 35 interviewees from the host and five to fifteen interviewees from the agent domain. The retrospective case studies were on projects completed at the time of undertaking this research and this was undertaken through semi-structured interviews with key project actors and access to secondary data in the form of the project documentation.

The approach and logic to the case study analyses consisted of three main steps. The first step dealt with the 'finding out' phase of SSM to understand the real world problem situation. Four SSM based analyses was undertaken to interpret the problem situation. These four analyses and the manner in which they were applied to the case studies are described below:

- A 'rich picture' based analysis of the 'situation' surrounding each project intervention studied.
- Developing a role profile by undertaking an SSM based Analysis One of each PIP giving rise to candidate primary task systems for each project
- An analysis of the social background of the situation in each project studied in the form of an Analysis Two.
- A political analysis to understand the disposition of power in each project situation studied in the form of an Analysis Three.

The second step to the case study approach dealt with the application of SSM to develop purposeful activity models. Candidate Root Definitions (RDs) were developed based on the world views of key project actors arising from the Analysis One. The most relevant RD was then selected by the author and the structure of the Root Definition was tested using the CATWOE review (Checkland and Scholes, 1990). A Conceptual Primary Task Model of this RD was then developed. By continuing the application of SSM, the Conceptual Model was compared with the respective rich picture from each case in order to debate the issues that could be learnt from the IS initiatives in each PIP and propose feasible changes. The third step in the case study analysis dealt with a comparison of findings across cases both within each country and across countries. This led to a set of findings which are presented in the following section.

Research Findings

Two key themes have emerged from this qualitative research on project based IS initiatives in developing countries. Firstly the paper provides an SSM based conceptualisation on the information requirements of VTE. Secondly the paper provides an SSM based conceptual model on the nature and role of information systems in VTE.

Theme 1: The Role of Information in VTE

The project based IS initiatives observed in the nine VTE sector case studies involved the development of information systems (ISs) such as LMIS, EMIS, FMIS and BME. These ISs were developed as isolated initiatives with specifications to meet the needs of different sub-components in VTE and implemented by different consultants from the agent domain with participation of staff from the host domain. In order to understand the roles of these ISs it is important to reflect on the concept of information in VTE.

The VTE sector of a country does not belong to an organisation and in reality exists in a multi-organisational domain involving a complex array of different organisations. Within this organisational context a 'VTE sector' is traditionally seen as goal seeking and the role of ISs are to support in pursuit of goals or declared objectives (Hopkins, 1999; ILO, 2002). However, Checkland and Holwell (1998) points out that an 'organisation' is more complex and problematical than the conventional model of rational decision making in pursuit of declared objectives. Checkland and Holwell (1998) add that organisational action in this context needs to be expressed as managing a changing set of relationships rather than taking rational decision making to achieve goals. Having studied the nature of the VTE sectors in 3 different Asian developing countries it was reflected that in the multi-organisational context this vision of 'organisation' is more relevant to a VTE sector than the traditional view. In fact as understood from the cases a major problem is the existence of individuals, sub-groups and organisations within the VTE sector with quite different interests and agendas. Hence an SSM based model requiring 'accommodation' of interests and agendas and managing a set of relationships is more relevant to the VTE sector.

Therefore in trying to understand the role of information it is useful to interpret the observations gained from the PIPs in the VTE sectors of Vietnam, Laos and Sri Lanka in their multi organisational, cultural and political context in terms

of the position expressed by Checkland and Holwell (1998). Firstly it could be reflected that a multi-organisational situation such as the VTE sector has overall purposeful actions to take with formal or organisational agendas. For example an overall purposeful action within the agenda of the VTE sector or host domain is to 'take care of VTE within the priorities of the country'. Secondly the VTE sector maintains its members and brings in new members within a role structure with observable norms and values to facilitate its overall purposeful action. Thirdly these actors and sub-groups of actors are with interests and agendas of their own which provides distortions in the overall purposeful action and agenda of the VTE sector. Simultaneously there are external individuals and sub-groups (e.g. students wishing to study VTE, industrialists wishing to hire graduates, donor agencies trying to improve VTE, contracted consultants of the agent domain, trade organisations etc) with interests and agendas. Sometimes these external agendas and interests are even more powerful than the internal agendas, as it was found in the VTE sectors studied, and distorted the overall purposeful action and agenda of the organisation or the multi-organisational situation. Fourthly these different agendas and interests emerging from internal and external sources with distorting effect require accommodation which change and modify organisational (or multi-organisational) agendas and upon which action can be based. Fifthly taking purposeful action based on such accommodation is useful to be considered as managing a set of relationships. This process could be summarised as shown in figure 7.

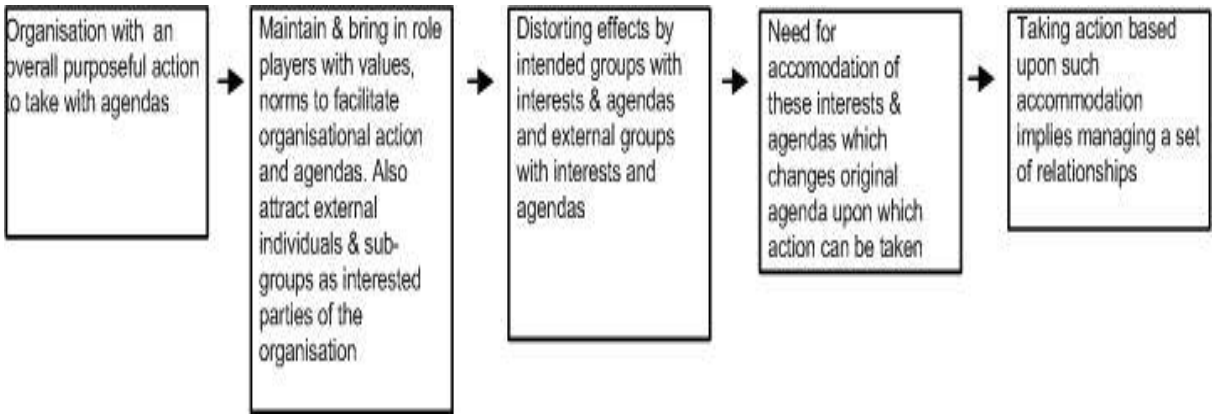

Figure 7: An Interpretation of the Process involved in Purposeful Action in the VTE sector

The observations made across the VTE sectors studied found that the way of managing multiple relationships should be based upon the 'understanding driven' by the need for managing such relationships rather than the 'discussions driven' by the need for 'managing' implied by Checkland and Holwell (1998). The researcher found in the VTE situations studied that the need to manage multiple relationships would drive towards an 'understanding' and this understanding was not necessarily based on discussion but rather by means of communication where discussion is a specific case. The researcher found that even if a 'discussion' takes place it is not a means to an end by itself but rather it is done with the purpose of achieving an 'understanding'. The researcher having worked with a wide array of organisations in this research found that this argument holds not only for a multi organisation situation such as VTE sector but also for any organisation. The overall model of an organisation taking purposeful action in the form discussed above could be visualised in figure 8.

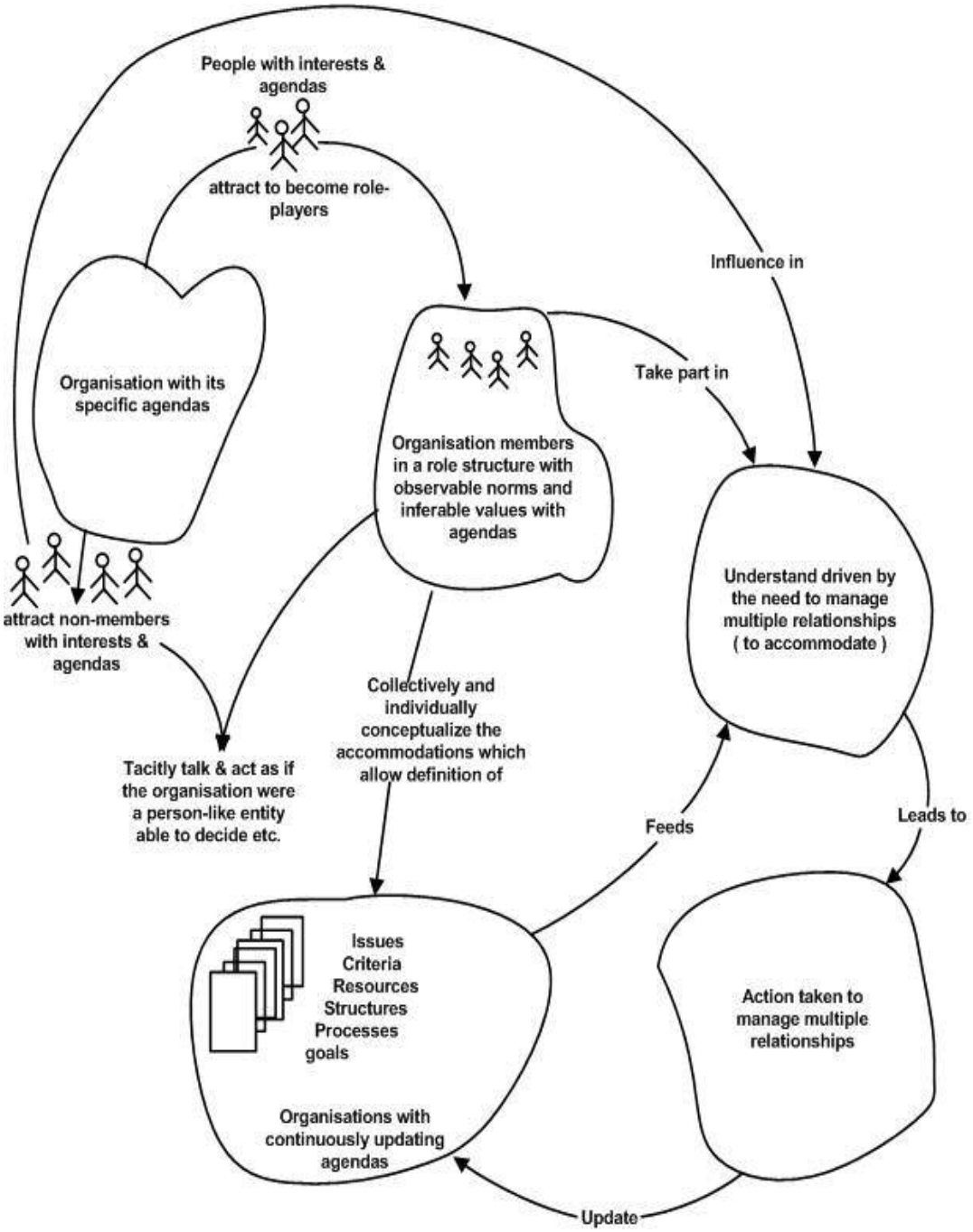

Figure 8: Reflection on the Model of the Concept of 'an Organisation' Taking Purposeful Action (Modified from Checkland and Holwell, 1998, figure 3.3: 83)

Interpreting the views expressed by Checkland and Holwell (1998) by taking the above context experienced by the researcher information could be recognised as the main resource that would facilitate organisational or multi-organisational situations such as a VTE sector to 'gain' continuous understanding of its changing agendas and purposeful action. Information also is the main resource to find ways and means of managing multiple relationships required by such action. It is also argued here that information facilitate learning and understanding required at all stages of the process involved in purposeful action previously summarised in figure 8. In these terms information could be seen as 'knowledge' that facilitates the 'learning' and understanding' process involved in the changing flux of organisational agendas and purposeful actions with internal and external distortions. Information also provides the 'knowledge' to accommodate interests of different individuals and groups and coping to maintain relationships demanded by these changes. The reflections on the requirement of information to manage purposeful action by the multi-organisational situation of a VTE sector or host domain is presented in figure 9.

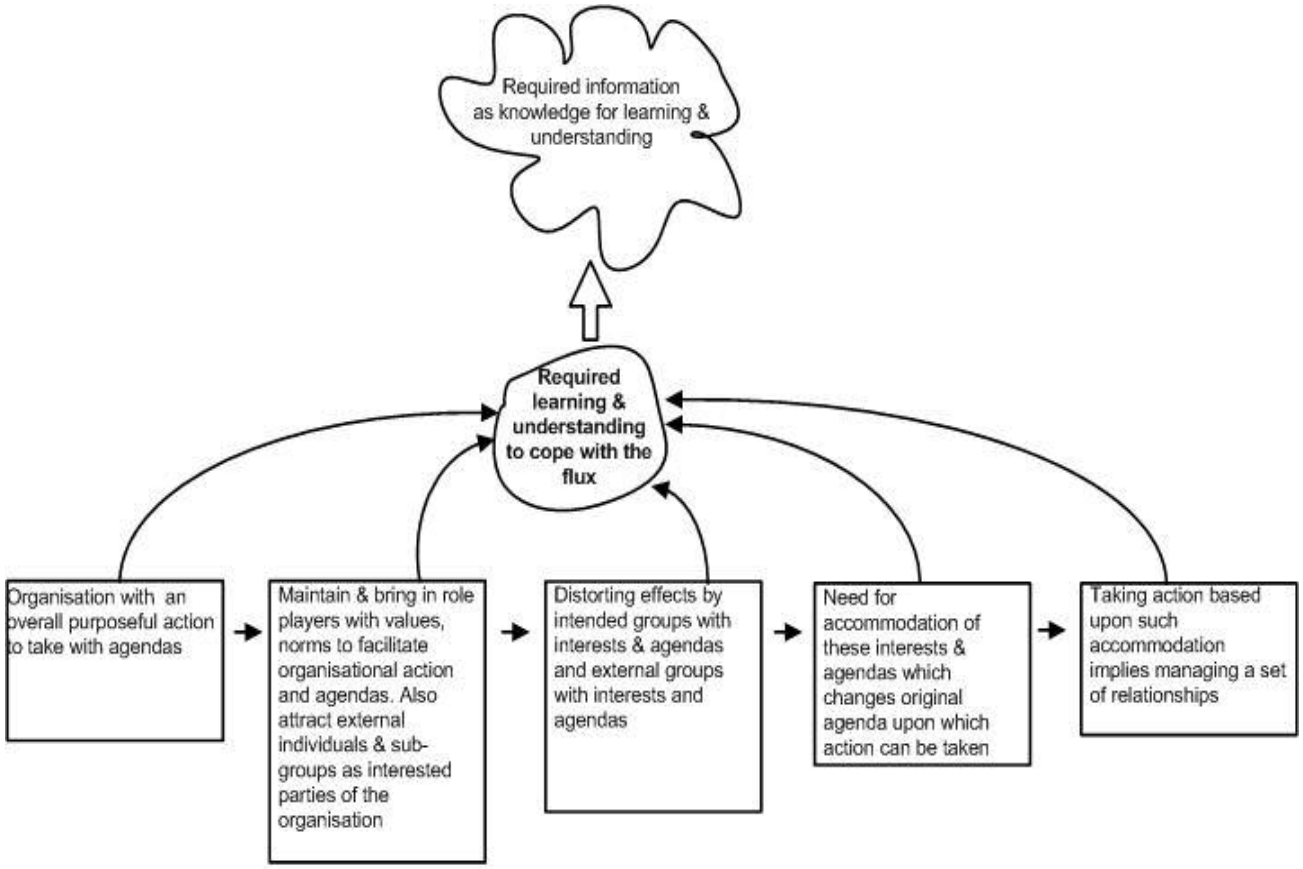

Figure 9: Reflections on the Requirement of Information to Manage Purposeful Action by a Multi-organisational VTE sector

Theme 2: Nature and Role of Information Systems in VTE

Having made reflections on the role of information in an organisation or multi-organisational situation of a VTE sector it is useful to extend the views to visualise the role of Information Systems (IS) whilst interacting with the concepts gained from the literature review.

By extending the concept of Sparreboom (2001) on LMIS and expanding it to ISs in general and recognising the need for such broad ISs is for 'Action takers', rather than for policy makers one could argue that the ISs entails an 'information cycle' and an 'action cycle'. These could be seen as the 'cycle that serves' and the 'cycle which is served' which is quite similar to the basic nature of ISs expressed by Checkland and Holwell (1998) indicating that a pair of linked systems, namely the system which serves and the 'system which is served' is entailed in an IS. By reflecting on the concepts of Sparreboom (2001) and those of Checkland and Holwell (1998) the nature and role of ISs in VTE could be visualised in terms of an interaction of an 'information cycle' and an 'action cycle' as per figure 10 Here Capta refers to data that is deliberately collected and organised.

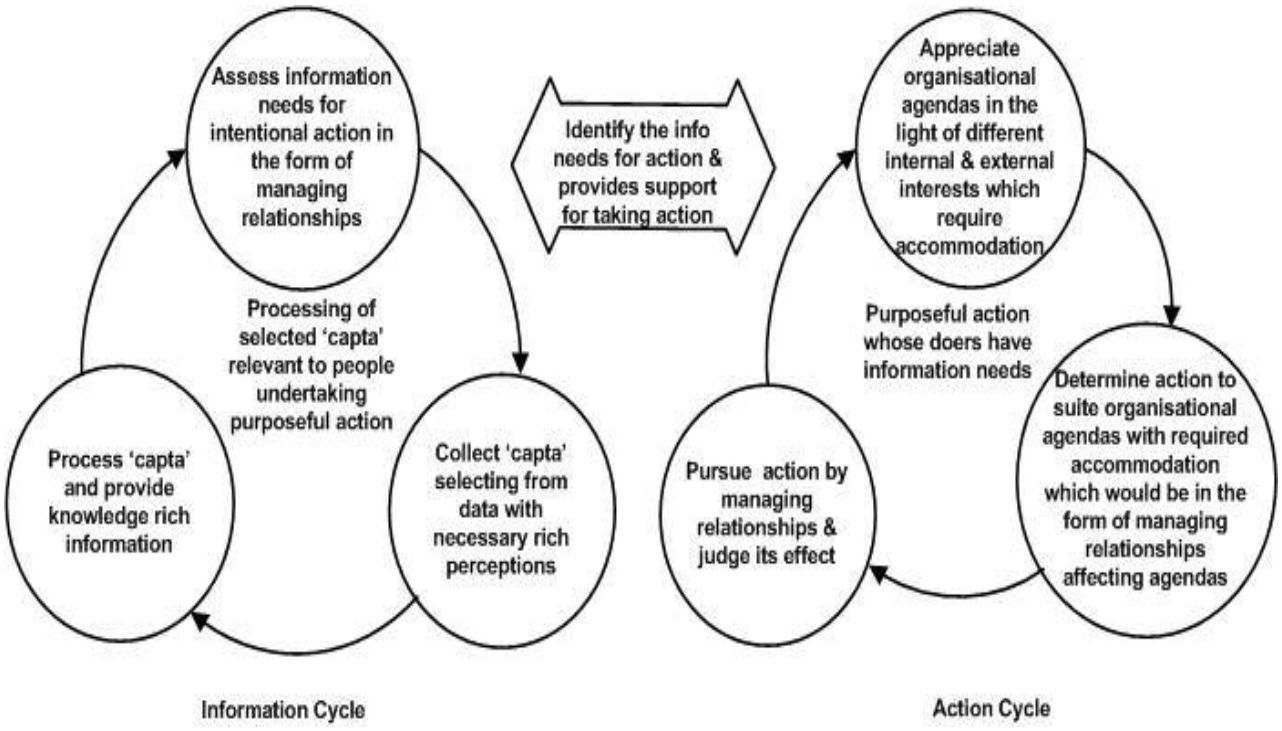

Figure 10: the Nature and Role of Information Systems in VTE

The concept presented in figure 10 enables understanding of the nature of dual systems associated with IS in terms of 'the system which serves' and 'the system which is served' as well as the basic nature of these systems. In order to develop more specific concepts related to ISs in VTE which would serve and support purposeful action in a VTE sector it is necessary to extend this idea of 'information cycle' and 'action cycle' or the 'system which serves' and the 'system which is served' to inform the IS requirements in the VTE sector. The advantages of the proposed approach are 1) the overall information required in the form of an integrated IS can be identified indicating an overall 'system which serves' in the light of an overall action or a 'system which is served' and hence indicating how information identified would cover action that it needs to support; 2) the overall information needs are identified as an integrated whole before interpreting in terms of specific IS and techniques such as LMIS, EMIS and BME and hence information could provide better support for action than the support expected from individually conceived ISs as at present and 3) all ISs are prepared based on the real world information requirements rather than simply providing some information that could be generated with the use of some prescribed techniques which permit such information as being done at present.

Conclusion

The research undertaken demonstrated the complexity of VTE sectors in developing countries with their complex organisational context and 'extra-soft' problem content involving difficult to structure problem situations. The research revealed that it is an extremely difficult task to manage project based IS initiatives by applying the traditional hard approaches used in developed countries assuming well defined problem situations. A softer approach to managing PIPs has been previously proposed by the authors (Brown and Gunawardena, 2006) using SSM which stresses the importance of input from the host domain in 'initiating' project based IS initiatives instead of following donor agency prescriptions. Application of the enquiring/learning cycle of SSM yielded a conceptual model of the requirement of information to manage purposeful action by a multi-organisational VTE host domain as presented in this paper. The recommended activities in the model accommodate the different interests and requests from the different stakeholders involved in the VTE sector. Furthermore a conceptual model on the nature and role of IS in VTE of developing countries was also developed and presented in this paper. These models provide better understanding on the information and IS needs of the host domain which can inform their perceptions in the tasks of initiating and management of project based IS initiatives in VTE of developing countries.

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